JAN MCLIN CLAYBERG

PATENT AND TECHNICAL TRANSLATION

JAN McLIN CLAYBERG*
OLAF BEXHOEFT**

CERTIFIED BY AMERICAN TRANSLATORS ASSOCIATION
* GERMAN AND FRENCH TO ENGLISH
** ENGLISH TO GERMAN

5316 LITTLE FALLS ROAD
ARLINGTON, VIRGINIA 22207

TELEPHONE (703) 533-0333
FACSIMILE (703) 533-0334
JANCLAYBERG@YAHOO.COM

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DECLARATION

The undersigned, Olaf Bexhoeft, hereby states that he is well acquainted with both the English and German languages and that the attached is a true translation to the best of his knowledge and ability of the German text of PCT/EP2004/051251 filed 06/25/2004, and published on 01/13/2005 as WO 2005/003009 A1, and of fourteen (14) amended claims.

The undersigned further declares that the above statement is true; and further, that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.

Olaf Bexhoeft

Olaf Bexhoeft
5316 Little Falls Rd.
Arlington, VA 22207-1522

Specification

Puncture Cylinder Provided with at Least one Puncture Strip

The invention relates to a spur cylinder with at least one spur strip in accordance with the preamble of claims 1 or 3.

In the course of operating a folding apparatus, the front end sections of signatures are speared on the spur needles of such a spur strip. The speared or spurred signatures are drawn by the rotating spur cylinder through a transfer gap formed by the spur cylinder and a folding jaw cylinder which has been placed against the latter. In the transfer gap a signature is grasped by the folding jaws of the folding jaw cylinder. At the same time the spur strip is pivoted into the recessed position and in this way releases the signature. Thereupon the front portion of the latter slides across a shell face of the spur cylinder opposite the direction of rotation of the spur cylinder. In the course of this the danger arises that this front portion passes over following spur needles of a further or, depending on the circumference of the spur cylinder, the same spur strip, on which a second signature has been speared, and is damaged by them. The danger of damage to the signature is particularly great in connection with delta folding production. In this case approximately two-thirds of a portion of the signature are located in front of the folding blade and one third of a portion of the signature behind the folding blade.

A spur cylinder with additional grippers, which act on the leading edge of the signature, is known from DE 43 40 585

C2. Since there the spur needles are retracted after the additional grippers made contact, the danger of damage of the removed signature by spur needles does not occur.

DE 100 18 775 A1, DE 21 26 610 A1 and DE 20 25 347 A1 disclose strippers for lifting signatures off the spur needles. A protective function is not provided, since these strippers act from below the speared signature.

The object of the invention is based on producing a spur cylinder with at least one spur strip.

The object is attained in accordance with the invention by means of the characteristics of claims 1 or 3.

End sections of signatures, which have been released from the spur cylinder, are grasped by the folding jaw cylinder, are pulled off the spur cylinder and brush over the shell face of the spur cylinder opposite its direction of rotation, are kept away from the spur needles of a following second spur strip by means of a deflector, which extends away from a spur cylinder at least some of the time. The signatures are protected by this against damage by the second spur strip.

Advantageously the deflector can be retracted into and extended from the spur cylinder. For example, it can be in a retracted state in order not to be interfering in the course of a passage through a transfer gap, which is formed by the spur cylinder and a folding jaw cylinder. After having passed through the transfer gap, the deflector can be extended in order to be able to perform the mentioned protective action for backward-moving signature sections. The deflector can again be retracted when the spur strip is retracted, in order to be ready for the next passage through

the transfer gap. In this case the retraction and extension of the deflector can be controlled by means of a known cam disk, such as is also used, for example, for retracting and extending spur needles and folding blades.

The deflector can be a strip extending axis-parallel in respect to the spur cylinder. This strip can extend over the entire width of the spur cylinder, or over a portion of the width of the spur cylinder. If the strip-shaped deflector extends only over a portion of the spur cylinder width, the spur cylinder can also have a plurality of deflectors, which are arranged staggered over the width. Moreover, a strip-shaped deflector can be provided with cutouts, so that it has teeth like a comb. In this case the teeth can be respectively assigned to spur needles of a spur strip.

The deflector advantageously has a radial projection in regard to the spur needles of one of the spur strips for an effective protective effect. It is assured in this way that the backward-moving end sections of the signatures brush over the spur needles without touching them. In this connection it is also possible to embody the deflector for covering the spur needles.

In a folding apparatus with a spur cylinder in accordance with the invention, the deflector is preferably arranged ahead of one of the spur strips in the direction of rotation of the spur cylinder, so that it is located between this spur strip and the backward-moving end section of the signature and shields the end section from the spur needles of the spur strip. In this case the deflector preferably has an inclined face pointing away from a shell face of the spur cylinder opposite the direction of rotation, so that the

backward-moving end section of the signature can possibly slide on this inclined face.

Exemplary embodiments of the invention are represented in the drawings and will be described in what follows.

Shown are in:

Fig. 1, a customary arrangement of a spur cylinder with the folding jaw cylinder placed against it, and with a signature held on the spur cylinder by spur needles,

Fig. 2, the arrangement from Fig. 1 with the signature in the process of being released,

Fig. 3, the arrangement from Fig. 1 directly following the release of the signature from the spur cylinder,

Fig. 4, an arrangement with a folding jaw cylinder and a spur cylinder in accordance with the invention, and with a signature held against it by spur needles,

Fig. 5, the arrangement from Fig. 4 directly following the release of the signature, and

Fig. 6, an enlarged representation of a backward-moving section of the signature from Fig. 5.

A schematic cross section through a known arrangement with a rotatable spur cylinder 01 and a rotatable folding jaw cylinder 02 is shown in Fig. 1. Both cylinders 01, 02 have been placed against each other and define a transfer gap 03. A sheet metal guide plate 04 is arranged at the outlet of the transfer gap 03, which substantially follows the contours of the two cylinders 01, 02. The folding jaw cylinder 02 has three folding jaws 06, which are operated in a known manner by means of a cam disk 07. Spur strips 08, 09, 11 with extensible spur needles and extensible folding blades 12, 13, 14 are alternatingly arranged on the spur cylinder 01. As

with the folding jaws 06, the movement of each of the spur strips 08, 09, 11 and folding blades 12, 13, 14 is controlled by a cam disk 07. An end section of a signature 16, which lies in front in respect to a direction of rotation of the spur cylinder 01, rests against the shell face of the spur cylinder 01 and extends on both sides of the transfer gap 03, is speared on the spur needles of the spur strip 11.

Fig. 1 represents a snapshot just prior to the signature 16 being picked up by a folding jaw 06 of the folding jaw cylinder 02. To this end, in the transfer gap 03 the signature 16 is pushed by the extending folding blade 12 into the folding jaw 06 of the folding jaw cylinder 02, wherein the spur needles of the spur strip 11 had been previously retracted and had released the signature 16. In the course of delta folding, the signature 16, which had been displaced opposite the direction of rotation of the spur cylinder 01 at a ratio of 2/3 to 1/3, is grasped by the folding jaw 06. In a non-represented variation, the signature 16 is grasped, slightly shifted off-center opposite the direction of rotation of the spur cylinder 01, by the folding jaw 06. The reason for this is that the front end section, in which the signature 16 had been speared on the spur needles of the spur strip 11, is later cut off in order to remove the puncture holes made by the spur needles.

A situation a short time after the grasping of the signature 16 by the folding jaw 06 is represented in Fig. 2. In this case the spur cylinder 01 and the folding jaw cylinder 02 have continued to rotate further for a distance. The signature 16 grasped by the folding jaw 06 begins to be released from the shell face of the spur cylinder 01, but has

not yet passed completely through the transfer gap 03. The folding blade 12 has again been retracted into the spur cylinder 01. The spur needles of the spur strip 11 have also been retracted, so that the end section of the signature 16 is released.

In the course of the subsequent rotation of the spur cylinder 01 and of the folding jaw cylinder 02, the signature 16 is taken along by the folding jaw cylinder 02. The sheet metal guide plate 04 stretches the signature 16 and prevents the formation of folds. Even before the signature 16 is completely released from the spur cylinder 01, the spur needles of the next following spur strip 08 have already passed through the transfer gap 03. A second signature 17 is speared on the spur needles of the spur strip 08. In the course of this the end section of the signature 16 which, because of the pulling effect of the folding jaw cylinder 02 runs opposite the direction of rotation of the spur cylinder 01, brushes over the extended spur needles of the spur strip 08 and in the course of this risks the danger of being damaged. This can be seen in Fig. 3.

Fig. 4 shows a corresponding arrangement consisting of the folding jaw cylinder 02 and a spur cylinder 18 in accordance with the invention. Here, like reference symbols correspond to like components as in the previously discussed drawing figures, so that their explanation need not be repeated again. As can be seen, deflectors 21, 22, 23 have been assigned to the three spur strips 08, 09, 11 of the spur cylinder 18 and are controlled by a cam disk 19. The deflectors 21, 22, 23, here shown in the retracted state, are strip-shaped sheet metal pieces, which can be extended from

and retracted into the spur cylinder 18, each of which has an inclined face 24 extending away from the shell face of the spur cylinder 18 opposite a direction of rotation (see Fig. 6). The deflectors 21, 22, 23 can also be embodied in the form of a comb, to whose teeth spur needles of one of the spur strips 08, 09, 11 are assigned. It is also conceivable that the deflectors 21, 22, 23 are made of metal, plastic, or a like material. Here, all deflectors 21, 22, 23 are arranged shortly in front of one of the spur strips 08, 09, 11 in the direction of rotation of the spur cylinder 18.

The situation immediately following the release of the signature 16 from the shell face of the spur cylinder 18 is represented in Fig. 5, wherein the spur needles of the spur strip 11 have been retracted and the signature 16 has been released from it. Thus, Fig. 5 shows a point in time corresponding to Fig. 3, in which the signature 16 is completely released from the spur strip 18 and its end section moves in a retrograde direction in respect to the movement of rotation of the spur cylinder 18. In this situation the deflector 22 assigned to the spur needles of the spur strip 18 is extended and shields the end section of the signature 16 from the spur needles of the spur strip 18.

Covering the spur needles, the deflector 21, 22, 23 is arranged within an angular range α of between 30°C to 45°C, or from 30°C to 60°C in respect to a straight line 26 determined by the axes of rotation of the spur cylinder 18 and the folding jaw cylinder 02.

The critical area in the surroundings of the end section can again be seen magnified in Fig. 6. At the time represented in Figs. 3 and 5, the spur needles of the spur

strip 08, which follow the spur needles of the spur strip 11, have passed through the transfer gap 03 and are located on the level of the returning end section of the signature 16. The signature 17, which follows the signature 16, is speared on the spur needles 08. The deflector 22 is extended and, in contrast to the known spur cylinder 01, shields the end section of the signature 16 from the spur needles of the spur strip 08 in the direction of rotation of the spur cylinder 18, as well as in the radial direction. Here, the deflector 22 is distinguished by a radial projection in regard to the spur needles 08. This projection enables it to cover the spur needles of the spur strip 08. Moreover, because of the inclined face 24, an easy sliding of the end section of the signature 16 at the deflector 22 over the spur needles is possible.

The deflectors 21, 22, 23 are extended out of the spur cylinder 18 by the cam disks 19 at those times, at which they have passed through the transfer gap 03. The deflectors 21, 22, 23 are retracted again into the spur cylinder 18 after the spur needles of the spur strips 08, 09, 11 respectively assigned to them have been retracted into the spur cylinder 18.

List of Reference Symbols

01	Cylinder, spur cylinder
02	Cylinder, folding jaw cylinder
03	Transfer gap
04	Sheet metal guide plate
05	-
06	Folding jaw
07	Cam disk
08	Spur strip
09	Spur strip
10	-
11	Spur strip
12	Folding blade
13	Folding blade
14	Folding blade
15	-
16	Signature
17	Signature
18	Spur cylinder
19	Cam disk
20	-
21	Deflector, strip, comb
22	Deflector, strip, comb
23	Deflector, strip, comb
24	Inclined face
25	-
26	Straight line